FNIRSI 菲尼瑞斯

DSO-TC3

三合一示波器
使用说明书

DIGITAL MULTIMETER INSTRUCTION MANUAL



目 录

CATALOG

用户须知

- 本说明书详细介绍了产品的使用方法以及注意事项和相关事宜，在使用本产品时请详细阅读手册，以便发挥产品的最佳性能。
- 不要在易燃易爆的环境中使用仪器。
- 仪器更换的废旧电池和报废的仪器不可与生活垃圾一同处理，请按照国家或者当地的相关法律法规处理。
- 当仪器出现任何质量问题或者对使用仪器有疑问时，可联系“菲尼瑞斯-FNIRSI”在线客服或者厂家，我们将在第一时间为你解决。

一、产品简介

本产品将数字示波器、电子元器件测试仪、信号发生器、通断测试、电压测量、温湿度测量、红外解码等功能巧妙地集成为一体，配用大尺寸的彩色点阵TFT显示屏，内置可充电锂电池，以小巧的体积带给用户更多、更强的实用功能，同时具有很好的便携性。

二、技术规格

2.1 整机主要规格与参数

显 示 屏	2.4英寸TFT彩屏，LED背光
供电电压	内置可充电锂电池
充电规格	USB Type-C，+5V
产品体积	79*103*31mm
支架规格	一体式可折叠支架

2.2 DSO数字示波器模式规格与参数

●该示波器具有10M的实时采样率，500K带宽

●具有完整的触发功能（单次、正常、自动），无论是对于周期模拟信号还是非周期的数字信号都能运用自如。

●最高可测量400V的电压信号。

●配备高效的一键AUTO，无需繁琐调节就能显示出被测波形。

实时采样率	10MSa/s	水平时基范围	1us-10s
模拟带宽	500Khz	触发模式	自动 正常 单次
输入阻抗	1MΩ	触发种类	上升沿/下降沿
耦合方式	AC/DC	波形冻结	是
测试电压范围	400V	自动测量	是
垂直灵敏度(x1)	10mV-10V		

2.3 TC3元器件测试模式规格与参数

●本仪器可自动识别并测量各种晶体管，包括NPN和PNP三极管、N沟道和P沟道场效应管、结型场效应管、二极管、双二极管、可控硅等，以及电阻、电感、电容等无源器件。

●自动检测引脚定义。

●自动解析NEC协议红外码。

●其他功能模式：包括电路通断测试、0~40V输入电压测量、PWM输出、0~32V稳压二极管测量、DS18B20温度传感器测量、DHT11温湿度传感器测量，等等。

类目	范围	参数说明
三极管	β大于10小于600	放大倍数hfe，基极-发射极电压Ube，Ic/Ie，集电极-发射极反向截止电流Iceo，Ices，保护二极管正向压降Uf ①
二极管	正向压降<4.5V	正向压降，结电容，反向漏电流 ②
稳压二极管	0.01~4.5V	（1-2-3测试区）正向压降，反向击穿电压
	0.01~32V	(K-A-A测试区）反向击穿电压
场效应管③	JFET	栅极电容Cg，Vgs下的漏极电流Id，保护二极管正向压降Uf ④
	IGBT	Vgs下的漏极电流Id，保护二极管正向压降Uf ④
	MOSFET	开启电压Vt，栅极电容Cg，漏源电阻Rds，保护二极管正向压降Uf ④
单向可控硅	开启电压<5V，门极触发电流<6mA	门极电压
双向可控硅		
电容	25pF~100mF	电容值,损耗系数Vloss⑤
电阻	0.01Ω~50MΩ	电阻值
电感	10uH~1000mH	电感值,直流电阻⑥
电池	0.1~4.5V	电压值，正负极性
输入电压	0~40V	电压值
DS18B20	0-85°C	温度
DHT11	0-60°C/5-95%	湿度
红外遥控解码	NEC协议红外码	显示用户码和数据码,并显示对应的红外波形

注:

①Ices、Iceo、Uf仅在有效时显示
②结电容、反向漏电流仅在有效时显示
③场效应管的开启或关闭电压须小于5V
④只有存在保护二极管时才显示
⑤Vloss仅在有效时显示
⑥两脚元件且在电阻小于2.1kΩ时测量电感

2.4 信号发生器规格与参数

信号发生器共有6种信号波形可选择,频率和幅值可调。

正弦波	1-10KHz/0-3.3V/50%	三角波	1-10KHz/0-3.3V/50%
方波	1-100KHz/3.3V/50%	斜坡	1-10KHz/0-3.3V/0-100%
脉冲波	1-100KHz/3.3V/0-100%	直流	0-3.3V

三、按键接口解析

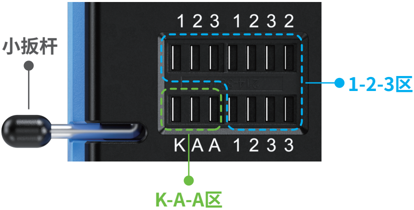
3.1 按键



按键	操作	功能
↶	短按	开机/返回
	长按	关机
OK / MENU	短按	进入/确认操作/重新测量
	长按	进入系统设置
▶ HOLD	短按	右移/切换
	长按	在示波器模式显示波形时关闭或打开参数显示
◀ RUN	短按	左移/切换
	长按	在示波器模式显示波形时停止或者运行
▼	短按	下移/切换/数值减
	长按	连续切换/数值连续减
▲	短按	上移/切换/数值加
	长按	连续切换/数值连续加

隐藏按钮	操作	功能
侧面小孔	轻戳	复位设备

3.2 测试插座



●共有五种不同的测试插孔为便于描述,将插座分为1-2-3区和K-A-A区(如上图)。

●测试插座在屏幕左下方,为带锁紧装置的14孔双排插座,每个插孔标记1、2、3、K、A,标号相同者是内部短接的,作用相同。

●插座左端有个小扳杆,立起时插孔放松,此时插入或取出被测元件,转下时插孔锁紧并进行测试。

●插入被测元件并锁紧后,按 OK/MENU 键进行测试,测试仪自动识别出元件的引脚名称及所在的测试点,并显示到屏幕。

●当测试2个引脚的元器件时,可以插入1-2-3区的任意两个不同标号的孔中,不分顺序。

●当测试3个引脚的元器件时,可以插入1-2-3区的任意三个不同标号的孔中,不分顺序。

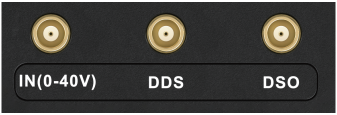
●K-A-A插孔为耐压测试专区,内有约30V以上直流高压,K正、A负,用于耐压测试,不可混用。被测元器件如稳压二极管的正极插入A、负极插入K。

⚠ 注意

●测电容前要先将电容器放电,否则可能烧坏仪器

●不建议在线或带电测试

3.3 信号接口



顶面均匀分布3个MCX同轴插座,它们外圈是连在一起共地的,用途分别是:

【IN (0~40V)】-测试电压输入口,芯线为正,最大被测电压不可超过DC40V

【DDS】-信号发生器信号输出口,输出可调脉宽的五种波形信号

【DSO】-示波器测试信号输入口,最大输入电压不可超过40Vpk

注意

测试连线时,应使用带有MCX插头的测试线与本仪器相连。

3.4 充电接口

- 本仪器内置大容量锂电池供电,底面设置USB Type-C充电口连接5V充电头进行充电。
- 充电时指示灯红色常亮,充满电指示灯绿色常亮。

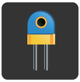
四、操作及页面说明

4.1 开关机





首页面共有四个选项，短按左右键切换功能：



晶体管测试仪



示波器

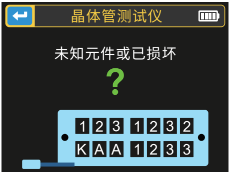


信号发生器

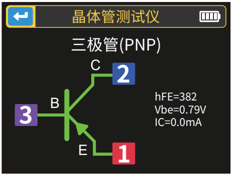


工具箱

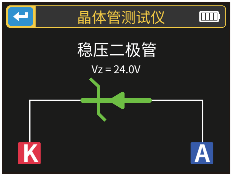
4.2 晶体管测试仪操作及功能说明



在首页面短按左右键 ◀ RUN 、▶ HOLD 切换到晶体管测试仪功能，短按确认键 OK MENU 进入晶体管测量页面如下，此为没有测量任何元器件时。



如三极管测量，短按 OK/MENU 开始测量。



如稳压管测量（注意：稳压二极管为K-A-A插孔，正负极区分），短按 OK/MENU 开始测量。

1-2-3 区测试座使用说明

选择该区适当位置、不同标号的插孔，将晶体管、电阻、电容、电感等被测元器件的引脚插入并锁紧后，点按 OK/MENU 启动测试，等待几秒钟后，测试结果会在屏幕上显示。

- ●可以检测出双极型晶体管和MOSFET内部的保护二极管并显示在屏幕上。
- ●测量双极型晶体管的电流放大系数(hFE)和发射结的导通电压。达林顿晶体管可以通过高阈值电压和高电流放大系数识别。
- ●测量三极管，其参数只有在测量有效时才会显示。
- ●二极管的等效电容C和反向漏电流只有在测量有效时才会显示。
- ●场效应管的开启或关断电压需小于5V，否则测出的结果只有它的等效参数(二极管、电容等)。
- ●可控硅的开启电压需小于5V，此外，其维持导通的触发电流需小于6mA，否则无法正确测量。

●测量电容时显示的vLoss是损耗、衰减的意思,这个值越大,电容性能越差,越接近报废。20pF以下的电容,经验做法是并一个20pF的电容测试。

●测量电感的量程为10uH-1000mH,在电阻小于2.1kΩ时才进行电感测量。空心线圈和功率电感不能直接测电感,建议尝试串联合适的色环电感测试。

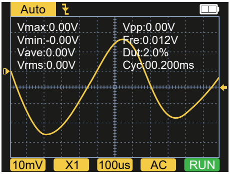
●测试座输出电流为6MA,需要更大电流驱动的可控硅。

●LED检测为二极管,正向压降比正常值偏高。双发光二极管检测为双二极管。检测同时发光二极管会闪亮。

K-A-A测试座说明

将被测元器件如稳压二极管的正极插入A、负极插入K,锁紧插座后点按 OK/MENU 启动测试。本仪器能测量的稳压管的最大范围为24V。

4.3 示波器操作及功能说明



在首页面短按左右键 ◀RUN、▶HOLD 切换到示波器功能,短按确认键 OK/MENU 进入示波器页面如图。

屏幕底下和左上角的参数可以通过短按左右键 ◀RUN、▶HOLD 选择,选中效果后按顺序一个一个切换,上下键▲、▼ 切换或调整;短按 OK/MENU 键AUTO,自动调整波形,长按左键 ◀RUN 切换暂停STOP和运行RUN。

●为触发边沿指示图标触发模式指示图标。

●Auto表示自动触发, Single表示单次触发,Normal表示正常触发

●为垂直灵敏度,表示垂直方向一大格代表的电压。

●1X/10X模式指示图标,这个必须和探头手柄上的1X/10X开关设置保持一致,若探头是1X档,那么示波器也要设置为1X档,1X测量±40V电压,10X测量±400V电压。

●100uS为水平时基,表示水平方向一大格代表的时间长度。

●AC/DC为输入耦合方式指示图标,AC表示交流耦合,DC表示直流耦合。

●RUN/STOP为运行暂停指示图标,RUN表示运行,STOP表示暂停, 长按左键切换。

实时测量参数

长按右键可以显示/隐藏在屏幕上半部分显示的8个实时测量参数:

Vmax=最大电压	Vpp=峰峰电压
Vmin=最小电压	Fre=频率
Vave=平均值	Dut=占空比
Vrms=有效值电压	Cyc=周期

示波器探头

●使用MCX插头的示波器探头插入顶面【DSO】插孔中,先调整好探头上的衰减档,将探头的接地夹接到被测电路的“参考地”。

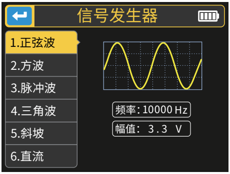
●探头尖端或勾子稳妥接到电路的被测节点,在屏幕上观察被测点的电压波形。

注意

●探头衰减倍率应与被测信号电压相匹配,不可测量超过最大量程的电压信号。

●测量超过安全电压的信号时,人体不得碰触仪器的外露金属部分,以免遭受电击。

4.4 信号发生器操作及功能说明



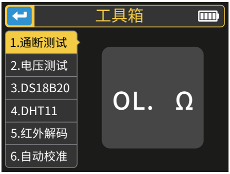
在首页面短按左右键 ◀RUN、▶HOLD 切换到信号发生器功能，短按确认键 OK/MENU 进入信号发生器页如图。

共有6种信号波形可选择：

●正弦波　●方波　●脉冲波　●锯齿波　●三角波　●直流

短按上下键▲、▼切换，右键 ▶HOLD 可进入选择改变频率还是幅值，再短按右键 ▶HOLD 可改变数值，短按左键 ◀RUN 退出。(频率上限为10000Hz，幅值上限为3.3V)

4.5 工具箱



在首页面短按左右键 ◀RUN、▶HOLD 切换到工具箱，短按确认键 OK/MENU 进入具箱页面如图。

工具箱共有6种功能选项：

●通断测试(测通断)
●电压测试
●DS18B20数字温度测试
●DHT11温湿度测试
●红外解码
●自动校准

短按上下键▲、▼ 切换，切换到相应的功能后会自动测量。

●**通断测试：**利用测试座的测试插孔1、2、3任意两个角进行连续的电阻测试，若电路为低阻，则判断为“通”，响起蜂鸣声 。

●**电压检测：**需把MCX测试线插入顶端插孔【IN　(0~40V)】中，对测试线间的电压进行检测。

●**DS18B20：**按屏幕提示将温度传感器插入测试座后进行测量。

●**DHT11：**按屏幕提示将温湿度传感器插入测试座后进行测量（注意：DHT第三脚悬空不接）。

●**红外解码：**在测试仪待测状态，将红外遥控器对准测试仪面板上的“IR"标记，按下遥控器按键，仪器自动开始接收红外信号并进行解码处理，解码成功后将显示用户码和数据码，并显示对应的红外波形。如果解码失败或无法解码，则不显示用户码和数据码，此时如果在测试仪界面则不能进入红外解码界面，如果在红外解码界面则仍然显示上次成功的解码信息。

●**自动校准：**按提示将三脚的短路线插入测试座的1-2-3插孔中,自动开始校准,校准过程中根据提示断开短接线后,等进度条行进到100%便完成了对本仪器当前模式的校准,无需进行其它操作。

⚠ 注意

外部电路必须处于断电状态，否则可能损坏仪器。

五、设置菜单



长按 OK/MENU 进入系统设置页面如图。

可设置项目有：

●开机LOGO　●背光亮度
●系统语言　●默认模式
●系统音量　●关于

短按上下键 ▲、▼ 切换，短按左右键 ◀ RUN、▶ HOLD 调整参数或切换状态。

六、固件升级

打开升级上位机软件，电脑与设备之间USB线连接，然后先下键 ▼ 再按开机键 进入升级页面，最后在上位机页面选择相应的固件升级即完成固件升级。

七、常见问题解析

问：如何判断电池是否充满？

答：电池充满后，充电指示灯会由红色变为绿色。

问：为什么测试的波形左右晃动不停，无法固定？

答：需要调节触发电压，即右边的黄色箭头。在触发模式下，按上下键调节触发电压。把黄色指示箭头调节到波形上下之间后，波形即可被触发以及固定。

问：为什么测一节电池或其他直流电压时没有波形？

答：电池电压信号是稳定直流信号，是没有曲线波形的。在直流耦合模式下调节垂直灵敏度，会出现一条往上或者往下的偏移直线的波形，如果是交流耦合，则无论怎么调节都没有波形。

问：为什么测量的市电220V波形并不是很标准的正弦波，有失真？

答：市电电网中一般都带有污染，含有较多的高次谐波成分，这些谐波叠加在正弦波上就会表现出一个失真的正弦，属于正常现象。一般市电波形都是失真的，和示波器本身无关。

问：为什么测量MOSFET、IGBT得出的结果是二极管、电容等参数？

答：由于MOSFET或IGBT的开启或关断电压大于5V（芯片最大供电电压）导致MOSFET或IGBT无法正常开启或关断，所以只能测出它的等效参数。

八、注意事项

●收到设备后,请在充满电后使用。

●测量高压时,禁止碰触示波器任何金属部位,以免造成触电风险。

●尽量不要在充电时,进行高压测试。

●请勿将本机放置在不稳固或有可能受到强烈震动的地方。

●请勿将本机放置在高湿度、多尘、阳光直射、户外或接近热源的地方。

●本仪器内置3.7V可充电锂电池供电,长时间使用时,请使用电源适配器供电,延长电池使用寿命。

●长时间不使用时,应将电池放电至3.7V后存放,且需每季度充放电循环一次。

●请使用说明书规格范围内的电压进行充电。

●使用示波器模式的时候要注意档位的选择,示波器的档位跟探头的档位要保持一致。

●校准时,需要拔掉BNC探头,或者探头正负极短接。

九、生产信息

产品名称:三合一数字示波器

品牌/型号:菲尼瑞斯/DOS-TC3

服务电话:0755-83242477

生产商:深圳市菲尼瑞斯科技有限公司

网址:www.fnirsi.cn

地址:广东省深圳市龙华区大浪街道伟达工业园C栋西边8楼

执行标准:GB/T 15289-2013

NOTICE TO USER

- This manual introduces the use method, precautions and related matters of the product. When using this product, please read the manual carefully in order to obtain the best performance of the product.
- Do not use the instrument in a flammable and explosive environment.
- The used batteries cannot be disposed of with domestic waste. Please follow the national or local relevant laws and regulations to deal with it.
- If there is any quality problem with the instrument or you have questions about it's use, you can contact FNIRSI online customer service or the manufacturer, we will promptly solve it for you.

1.INTRODUCTION

This product combines a digital oscilloscope, electronic component tester, signal generator, continuity test, voltage test, temperature and humidity measurement, infrared decoding and other functions are skillfully integrated. It is equipped with a large-size color TFT display, built-in rechargeable lithium battery, brings users stronger and more practical functions with good portability.

2.TECHNICAL SPECIFICATIONS

2.1 Specifications and parameters of the device

Display screen	2.4 inch TFT color screen, LED backlight
Supply voltage	Rechargeable lithium battery
Charging specifications	USB Type-C, +5V
Product volume	79*103*31mm
Bracket specifications	All-in-one foldable stand

2.2 Specifications and parameters of the DSO Digital Oscilloscope

- The oscilloscope has a real-time sampling rate of 10MSa/s and a bandwidth of 500KHz.
- With complete trigger function (single, normal, automatic), no matter if you' re using periodic analog signals or non-periodic digital signals.
- Maximum measured voltage signal is 400V.
- Equipped with efficient AUTO, the measured waveform can be displayed without cumbersome adjustments.

Real-time sample rate	10MSa/s
Analog Bandwidth	500Khz
Input resistance	1MΩ
Coupling method	AC/DC
Test voltage range	400V
Vertical Sensitivity (x1)	10mV-10V
Horizontal time base range	1us-10s
Trigger mode	Auto / Normal / Single
Trigger type	Rising edge / Falling edge
Waveform Freeze	Yes
Automatic measurement	Yes

2.3 Specifications and parameters of TC3 component test mode

- The instrument can automatically identify and measure various transistors, including NPN and PNP triodes, N-channel and P-channel mosfet, junction mosfet, diodes, dual diodes, thyristors, and resistors, inductors, capacitors and other passive components.
- Automatic detection of pin definition.
- Automatically analyze NEC protocol infrared code.
- Other functional modes: Including circuit continuity test, 0~40V input voltage measurement, PWM output,0~32V regulated diode measurement, DS18B20 temperature sensor measurement, DHT11 temperature and humidity sensor measurement, etc.

Category	Range	Parameter Description
Triodes	β is greater than 10 and less than 600	Magnification hfe, base-emitter voltage Ube, Ic/Ie, collector-emitter reverse cut-off current Iceo, Ices, protection diode forward voltage drop Uf①
Diodes	Forward voltage drop <4.5V	Forward voltage drop, junction capacitance, reverse leakage current②
Reglulated diode	0.01~4.5V	(1-2-3 test area) forward voltage drop, reverse breakdown voltage.
	0.01~32V	(K-A-A test area) reverse breakdown voltage
MOSFET③	JFET	Gate capacitance Cg, drain current Id under Vgs, protection diode Tube forward pressure drop Uf④
	IGBT	Drain current Id under Vgs, protection diode forward voltage drop Uf④
	MOSFET	Turn-on voltage Vt, gate capacitance Cg, drain-source resistance Rds, protection Diode forward voltage drop Uf④
SCRs	Turn-on voltage <5V, gate Pole trigger current <6mA	Gate voltage
TRIAC		
Capacitor	5pF~100mF	Capacitance value, loss factor Vloss⑤

Category	Range	Parameter Description
Resistor	0.01Ω~50MΩ	Resistance
Inductor	10uH~1000mH	Inductance value, DC resistance⑥
Battery	0.1~4.5V	Voltage value, positive and negative polarity
Input voltage	0~40V	Voltage value
DS18B20	0-85°C	Temperature
DHT11	0-60°C/5-95%	Humidity
Infrared remote decoding	NEC protocol infrared code	Display user code and data code, and display the corresponding infrared waveform.

NOTE:

①Ices, Iceo, Uf are only displayed when they are valid.

② Junction capacitance and reverse leakage current are only displayed when they are valid.

③The turn-on or turn-off voltage of the FET must be less than 5V.

④ Displayed only when there is a protection of diode.

⑤Vloss is only displayed when it is valid.

⑥Two-legged components and measure the inductance when the resistance is less than 2.1kΩ.

2.4 Specifications and parameters of the signal Generator

The signal generator has a total of 6 waveforms to choose from, with adjustable frequency and amplitude.

Triangle wave	1-10KHz/0-3.3V/50%
Square wave	1-100KHz/3.3V/50%

Pulse wave	1-100KHz/3.3V/0-100%
Triangle wave	1-10KHz/0-3.3V/50%
Ramp	1-10KHz/0-3.3V/0-100%
DC	0-3.3V

3. KEY INTERFACE ANALYSIS

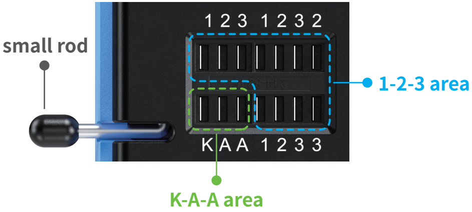
3.1 Button



Hide button	Operation	Function
Side hole	Tap	Reset

Button	Operation	Function
↶ (Return)	Short press	Start up/Return
	Long press	OFF
OK / MENU	Short press	Enter/confirm operation/remeasure
	Long press	Enter system settings
▶ HOLD	Short press	Move right/toggle
	Long press	To turn off or on the parameter display when displaying a waveform in oscilloscope mode.
◀ RUN	Short press	Move left/switch
	Long press	Stop or run while displaying waveforms in scope mode.
▼	Short press	Move down/switch/value minus
	Long press	Continuous switching/value continuous subtraction.
▲	Short press	Move up/Switch/Add
	Long press	Continuous switching/continuous addition of values.

3.2 Test socket



●A total of five different test sockets are divided into 1-2-3 area and K-A-A area for the convenience of description(as pictured above).

●The test socket is at the bottom left of the screen, it is a 14-hole double-row socket with a locking device, and each socket is marked

1, 2, 3, K, A, those with the same label are short-circuited internally, and have the same function.

●There is a small lever at the left end of the socket. When standing up, the socket is relaxed. At this time, insert or take out the component under test, turn the socket is locked and tested when lowered.

●After inserting the tested component and locking it, press OK/MENU to test, and the tester will automatically identify the pin name of the component and the test point where it is located are displayed on the screen.

●When testing 2-pin components, you can insert any two different labels in the 1-2-3 area holes, in any order.

●When testing 3-pin components, you can insert any three different labels in the 1-2-3 area holes, in any order.

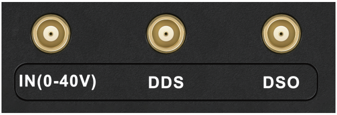
●The K-A-A jack is a special area for withstand voltage testing, which contains a DC high voltage of about 30V or more, K is positive and A is negative, and is used for withstand voltage pressure test, do not mix. Insert the anode of the component under test, such as a Zener diode, into A and the cathode into K.

⚠ Notice

●Discharge the capacitor before measuring the capacitance, otherwise it may burn out the instrument.

●It is not recommended to test online or live.

3.3 Signal interface



Three MCX coaxial sockets are evenly distributed on the top surface, and their outer rings are connected together for a common ground, and they are used for different purposes:

【IN (0~40V)】-Test voltage input port, the core wire is positive, the maximum measured voltage cannot exceed DC40V.

【DDS】-Signal generator signal output port, output five waveform signals with adjustable pulse width.

【DSO】-Oscilloscope test signal input port, the maximum input voltage cannot exceed 40Vpk.

Notice

When testing the connection, use the test line with MCX plug to connect with the instrument.

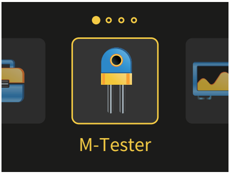
3.4 Charging interface

- The instrument is powered by a built-in large-capacity lithium battery, and the bottom surface is equipped with a USB Type-C charging port connected to a 5V charger.
- The indicator light is always red when charging, and the indicator light is green when fully charged.

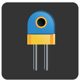
4.OPERATION AND DESCRIPTION

4.1 Switching on and off





There are four options on the home page, short press the left and right keys to switch functions:



M-Tester



Oscilloscope

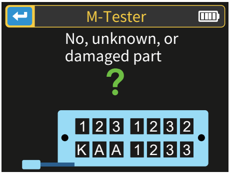


Generator

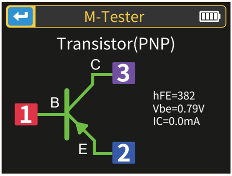


Tools

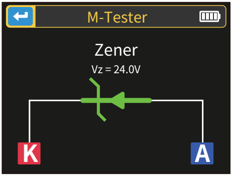
4.2 Operation and function description of the transistor tester



Short press the left and right keys ◀ RUN / ▶ HOLD to switch to the transistor detector, short press the confirmation key OK MENU to enter the transistor measurement page (as follows), this is the situation under not measured any components.



For triode measurement, short presst OK/MENU to start measurement.



For reglulated diode measurement (Note: reglulated diode is K-A-A socket, positive and negative), short press OK/MENU to start measurement.

1-2-3 Zone Test Bench Instructions for Use

Select an appropriate position in this area and jacks with different labels, and connect transistors, resistors, capacitors, inductances, etc. After the pins of the components are inserted and locked, click OK/MENU to start the test, wait for a few seconds, the result will be displayed on the screen.

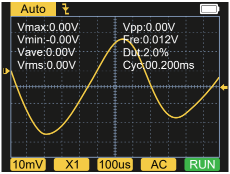
- The inside bipolar transistors of the Protective diodes and MOSFETs can be detected and displayed on the screen.
- Measure the current amplification factor (hFE) of the bipolar transistor and the conducting voltage of the emitter junction. Darlington transistors can be identified by the high threshold voltage and high current amplification factor.
- Measuring triode, its parameters will only be displayed when the measurement is valid.
- The equivalent capacitance C and reverse leakage current of the diode will only be displayed when the measurement is valid.
- The turn-on or turn-off voltage of the mosfet must be less than 5V, otherwise the measured result is only its equivalent parameters (diodes, capacitors, etc.).

- The turn-on voltage of the thyristor must be less than 5V, in addition, the trigger current for maintaining conduction must be less than 6mA,Otherwise it cannot be measured correctly.
- The vLoss displayed when measuring capacitance means loss and attenuation. The larger the value, the worse the capacitance performance.For capacitors below 20pF, the rule of thumb is to test with a 20pF capacitor.
- The measuring range of inductance is 10uH-1000mH. The inductance is only measured when the resistance is less than 2.1kΩ. Air-core coils and power inductors cannot directly measure the inductance. It is recommended to try to connect a suitable color ring electrode in series to test.
- The output current of the test socket is 6MA, which requires a SCR driven by a larger current.
- The LED is detected as a diode, and the forward voltage drop ratio is higher than the normal value. Dual LEDs are detected as dual diode. The leds will flash while detecting.

K-A-A Test Socket Instructions

Insert of the component postive, such as the reglulated diode, into A and the cathode into K, lock the socket and click OK/MENU to start the test. The max measurement range of the reglulated diode is 24V.

4.3 Operation and function description of the oscilloscope



On the home page, short press the left and right keys ◀ RUN / ▶ HOLD to switch to the oscilloscope function, and short press the confirmation key OK/MENU to enter the oscilloscope page (as shown).

The parameters in the bottom and upper left corners of the screen can be selected by short pressing the left and right keys ◀ RUN / ▶ HOLD , and switching one by one after the effect is selected, and the up and down keys ▲ / ▼ , to switch or adjust; short press the OK MENU AUTO key to automatically adjust the shape, and long press the left key ◀ RUN to switch between STOP and RUN.

●The trigger mode indicator icon is the trigger edge indicator icon.

●Auto means automatic trigger, Single means single trigger, Normal means normal trigger.

● The vertical sensitivity, indicating the voltage represented by a large grid in the vertical direction.

●1X/10X mode indicator icon must be kept consistent with the 1X/10X switch setting on the probe handle, if the probe is 1X, then the oscilloscope should also be set to 1X, 1X measures ± 40V voltage, 10X measures ± 400V voltage.

●100uS is the horizontal time base, which means the length of time represented by a large grid in the horizontal direction.

●AC/DC is the indicator icon of the input coupling mode, AC means AC coupling, and DC means DC coupling.

●RUN/STOP is the indicator icon for running/pause, RUN means running, STOP means pause, long press the left button to switch.

Real-time measurement parameters

Long press the right button to show/hide the 8 real-time measurement parameters displayed in the upper part of the screen:

Vmax=Maximum voltage	Vpp=Peak-to-Peak voltage
Vmin=Minimum voltage	Fre=Frequency
Vave=Average value	Dut=Duty
Vrms=RMS voltage	Cyc=Cycle

Oscilloscope probe

●Insert the oscilloscope probe with MCX plug into the [DSO] jack on the top surface, first adjust the attenuation gear on the probe, and connect the ground clip of the probe to the "reference ground" of the tested circuit.

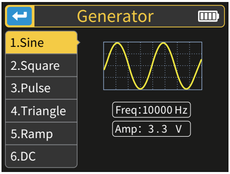
●Connect the probe tip or hook to the measured node of the circuit, and observe the voltage waveform of the measured point on the screen.

⚠ Notice

●The attenuation factor of the probe should match with the voltage of the measured signal, and the voltage signal exceeding the maximum range cannot be measured.

●When measuring signals exceeding the safe voltage, must not touch the exposed metal parts of the instrument to avoid electric shock.

4.4 Operation and function description of the signal generator



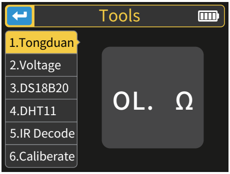
On the home page, short press the left and right keys ◀ RUN / ▶ HOLD to switch to the signal generator function, and short press the confirmation key OK MENU to enter the signal generator page (as shown).

There are 6 signal waveforms to choose from:

- Sine wave
- Square wave
- Pulse wave
- Sawtooth wave
- Triangle wave
- DC

Short press the up and down keys ▲ / ▼ , and the right key ▶ HOLD to choose to change the frequency or amplitude, and then short press the right key ▶ HOLD to change the value, short press the left key ◀ RUN to exit. (Frequency upper limit is 10000Hz, amplitude value capped at 3.3V)

4.5 Toolbox



On the home page, short press the left and right keys ◀ RUN / ▶ HOLD to switch to the toolbox, and short press the confirmation key OK MENU to enter the toolbox page as shown in the figure.

There are 6 functions to choose from:

- ●Continuity test
- ●Voltage test
- ●DS18B20 digital temperature test
- ●DHT11 temperature and humidity test
- ●Infrared decoding
- ●Automatic calibration

Short press the up and down ▲ / ▼ , after switching to the corresponding function, it will automatically measure.

●**Continuity test:** Use any two corners of the jack 1, 2, and 3 of the test socket to conduct continuous resistance tests. If the circuit is low resistance, it will be judged as "connected" and a buzzer will sound.

●**Voltage detection:** Insert the MCX test line into the top jack [IN (0~40V)] to detect the voltage between the test lines.

●**DS18B20:** Follow the prompts on the screen to insert the temperature sensor into the test socket for measurement.

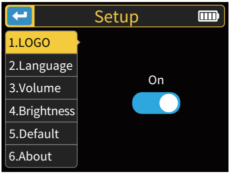
●**DHT11:** Follow the prompts on the screen to insert the temperature and humidity sensor into the test socket for measurement (Do not connect the third pin of the DHT).

●**Infrared decoding:** When the tester is under test, point the infrared remote control at the "IR" mark on the tester panel, press the button on the remote control, and the instrument will automatically start receiving infrared signals and performing decoding processing. After successful decoding, the user code will be displayed and data code, and display the corresponding infrared waveform. If the decoding fails or cannot be decoded, the user code and data code will not be displayed. At this time, if you are on the tester interface, you cannot enter the infrared decoding interface. If you are on the infrared decoding interface, the last successful decoding information will still be displayed.

● **Automatic calibration:** Insert the three-pin short wire into the 1-2-3 jack of the test socket according to the prompts, and the calibration will start automatically. After disconnecting the short wires according to the prompts in the calibration process, wait until the progress bar reaches 100% to complete the calibration under the current mode of the instrument, no other operations are required.

> **⚠ Notice**
>
> The external circuit must be powered off, otherwise the instrument may be damaged.

5. MENU SETTING



Long press OK/MENU to enter the system setting page as shown in the figure.

The configurable items are:

- Boot LOGO
- System volume
- Default mode
- System language
- Backlight brightness
- About

Short press the up and down keys ▲ / ▼ to switch, short press the left and right keys , ◀ RUN / ▶ HOLD to adjust parameters or switch states.

6.FIRMWARE UPGRADE

Open the upgrade software on the host computer, connect the computer and the device with a USB cable, then while pressing ▼ key, press the power key ↶ to enter the upgrade page. Finally select the corresponding firmware upgrade on the host computer page to complete the firmware upgrade.

7.ANALYSIS OF COMMON PROBLEMS

Q: How to judge whether the battery is fully charged?

A: After the battery is fully charged, the charging indicator will change from red to green.

Q: Why does the test waveform keep shaking from side to side and cannot be fixed?

A: The trigger voltage needs to be adjusted, which is the yellow arrow on the right. In trigger mode, press the up and down keys to adjust trigger voltage. After adjusting the yellow indicator arrow between the upper and lower of the waveform, the waveform can be triggered and fixed.

Q: Why is there no waveform when measuring a battery or other DC voltage?

A: The battery voltage signal is a stable DC signal without a curved waveform. Adjust the vertical sensitivity in the DC coupling mode, there will be an upward or downward offset straight line waveform, if it is AC coupling, no matter how you adjust it, there will be no waveform.

Q: Why is the measured 220V mains waveform not a standard sine wave with distortion?

A: The mains power grid is generally polluted and contains more high-order harmonic components. These harmonics are superimposed, so a distorted sine will appear on the sine wave, which is a normal phenomenon. General mains waveforms are all distortion, nothing to do with the oscilloscope itself.

Q: Why are the parameters of diodes and capacitances obtained when measuring MOSFETs and IGBTs?

A: Because the turn-on or turn-off voltage of the MOSFET or IGBT is greater than 5V (the maximum supply voltage of the chip), the MOSFET or IGBT cannot be turned on or off normally, so only its equivalent parameters can be measured.

8. PRECAUTIONS

- After receiving the device, please use it after it is fully charged.
- When measuring high voltage, do not touch any metal part of the oscilloscope to avoid the risk of electric shock.
- Try not to perform high voltage test while charging.
- Do not place the machine in an unstable place or where it may be subject to strong vibrations.
- Do not place the machine in places with high humidity, dust, direct sunlight, outdoors or near heat sources.
- The instrument is powered by a built-in 3.7V rechargeable lithium battery, please use a power adapter when using it for a long time in order to prolong battery life.
- When not in use for a long time, the battery should be discharged to 3.7V before storage, and it needs to be charged and discharged every quarter.
- Please use the voltage within the range specified in the manual for charging.
- When using the oscilloscope mode, pay attention to the selection of the 1X/10X attenuation, the attenuation of the oscilloscope needs to be same as the attenuation of the probe.
- When calibrating, it is necessary to unplug the BNC probe, or short the positive and negative poles of the probe.

9.CONTACT US

Any FNIRSI'users with anyquestions who comes to contact us wiil have our promise to get asatisfactory solution + an Extra 6-Month Warranty to thanks for yoursupport!
By the way, We have created an interesting community, welcome to contact FNIRSI staff to join our community.

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Tel: 0755-83242477 / +8613536884686

http://www.fnirsi.cn/

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